What is claimed is:

- 1. An ozone gas measurement method comprising the
- 2 steps of:
- 3 preparing a sensing element in which a dye
- 4 that changes in a light absorption characteristic of a
- 5 visible region upon reaction with ozone gas is deposited
- 6 in a pore of a porous material;
- 7 exposing the sensing element to a measurement
- 8 environment for a predetermined time; and
- 9 measuring an ozone gas amount in a measurement
- 10 target gas on the basis of a change in the dye before
- 11 and after exposing the sensing element to the
- 12 measurement environment for a predetermined time.
 - 2. A method according to claim 1, wherein the
- 2 step of measuring the ozone gas amount comprises the
- 3 step of measuring a change in light transmittance.
 - A method according to claim 2, wherein the
- 2 step of measuring the ozone gas amount comprises the
- 3 steps of
- 4 measuring the light transmittance of the
- 5 sensing element to obtain a first transmittance, and
- 6 measuring an ozone gas amount in the
- 7 measurement target gas on the basis of the first
- 8 transmittance, and a second transmittance before the

9 sensing element measured in advance is exposed to the 10 measurement environment for the predetermined time. 4. A method according to claim 1, wherein at 2 least some pores in the porous material are coupled to 3 pores on a surface of the porous material. 5. A method according to claim 1, wherein a pore in the porous material has such a pore diameter as to 3 attain a predetermined transmittance in the visible light region. A method according to claim 5, wherein the 2 pore diameter is not more than 20 nm at which the dye 3 can enter the pore. 7. A method according to claim 1, wherein the dye 2 comprises an aromatic compound having a diazo group. 8. A method according to claim 7, wherein the 2 aromatic compound comprises one material selected from 3 the group consisting of benzene, naphthalene, and 4 anthracene. 9. A method according to claim 7, wherein the dye comprises a compound having any one of a hydroxyl group, 3 a sulfurous acid group, and primary to tertiary amino

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groups. A method according to claim 1, wherein the dye 10. comprises a triphenylmethane stain. 2 A method according to claim 1, wherein the dye 11. contains fuchsonimine. A method according to claim 1, wherein the dye 12. contains indigo. A method according to any one of claims 10 and 13. 11, wherein the sensing element further comprises a 2 material having an alkali characteristic in addition to 3 the dye. 4 A method according to claim 1, wherein the 14. sensing element further comprises an acid gas sorbent in addition to the dye. 3 A method according to claim 14, wherein the acid gas sorbent comprises one material selected from the group consisting of glycerol and triethanolamine. 3 A method according to any one of claims 7 and 16. 12, wherein the sensing element further comprises an acid in addition to the dye.

- 17. A method according to claim 16, wherein the
- 2 acid comprises one acid selected from the group
- 3 consisting of hydrochloric acid, acetic acid, sulfuric
- 4 acid, and phosphoric acid.
 - 18. A method according to claim 16, wherein the
- 2 sensing element further comprises a hygroscopic compound
- 3 in addition to the dye and the acid.
 - 19. A method according to claim 18, wherein the
- 2 hygroscopic compound comprises one material selected
- 3 from the group consisting of glycerol and ethylene
- 4 glycol.
 - 20. A method according to any one of claims 7 and
- 2 12, wherein the sensing element further comprises a
- 3 buffer in addition to the dye.
 - 21. An ozone gas sensing element comprising:
- 2 a porous material; and
- a dye which is deposited in a pore of said
- 4 porous material and changes in a light absorption
- 5 characteristic of a visible region upon reaction with
- 6 ozone gas.
 - 22. An element according to claim 21, wherein at

- 2 least some pores in said porous material are coupled to
- 3 pores on a surface of said porous material.
 - 23. An element according to claim 21, wherein a
- 2 pore in said porous material has such a pore diameter as
- 3 to attain a predetermined transmittance in the visible
- 4 light region.
 - 24. An element according to claim 23, wherein the
- 2 pore diameter is not more than 20 nm at which the dye
- 3 can enter the pore.
 - 25. An element according to claim 21, wherein the
- 2 dye comprises an aromatic compound having a diazo group.
 - 26. An element according to claim 25, wherein the
- 2 aromatic compound comprises one material selected from
- 3 the group consisting of benzene, naphthalene, and
- 4 anthracene.
 - 27. An element according to claim 25, wherein the
- 2 dye comprises a compound having any one of a hydroxyl
- 3 group, a sulfurous acid group, and primary to tertiary
- 4 amino groups.
 - 28. An element according to claim 21, wherein the
- 2 dye comprises a triphenylmethane stain.

An element according to claim 21, wherein the 29. dye contains fuchsonimine. 2 An element according to claim 21, wherein the 30. dye contains indigo. 2 An element according to any one of claims 28 31. and 29, wherein said sensing element further comprises a 2 material having an alkali characteristic in addition to 3 4 the dye. 32. An element according to claim 21, wherein said sensing element further comprises an acid gas sorbent in 2 3 addition to the dye. An element according to claim 32, wherein the 33. acid gas sorbent comprises one material selected from 2 the group consisting of glycerol and triethanolamine. 3 An element according to any one of claims 25 34. and 30, wherein said sensing element further comprises an acid in addition to the dye. 3 An element according to claim 34, wherein the 35. acid comprises one acid selected from the group 2 3 consisting of hydrochloric acid, acetic acid, sulfuric

- 4 acid, and phosphoric acid.
 - 36. An element according to claim 34, wherein said
- 2 sensing element further comprises a hygroscopic compound
- 3 in addition to the dye and the acid.
 - 37. An element according to claim 36, wherein the
- 2 hygroscopic compound comprises one material selected
- 3 from the group consisting of glycerol and ethylene
- 4 glycol.
 - 38. An element according to any one of claims 25
- and 30, wherein said sensing element further comprises a
- 3 buffer in addition to the dye.
 - 39. An element according to claim 38, wherein the
- 2 buffer comprises phosphoric acid and
- 3 sodiumdihydrogenphosphate dehydrate.
 - 40. An ozone gas measurement apparatus comprising:
- 2 a light-emitting unit;
- 3 a light-detecting unit;
- a sensing element; and
- 5 a signal processing unit,
- 6 wherein said light-emitting unit emits light
- 7 having a predetermined wavelength,
- 8 said sensing element is interposed between

- 9 said light-detecting unit and said light-receiving unit,
- 10 and comprises a porous material, and a dye which is
- 11 deposited in a pore of the porous material and changes
- 12 in a light absorption characteristic of a visible region
- 13 upon reaction with ozone gas,
- 14 said light-detecting unit comprises a
- 15 light-receiving surface arranged to face said
- 16 light-emitting unit, receives, via said sensing element,
- 17 light emitted by said light-emitting unit, and outputs a
- 18 signal corresponding to a light quantity received by the
- 19 light-receiving surface, and
- 20 said signal processing unit calculates an
- 21 ozone gas amount on the basis of the signal output from
- 22 said light-detecting unit and a light absorption
- 23 characteristic, obtained in advance, of said sensing
- 24 element which contains the dye before reaction with the
- 25 ozone gas.
 - 41. An apparatus according to claim 40, wherein at
 - 2 least some pores in the porous material are coupled to
 - 3 pores on a surface of the porous material.
 - 42. An apparatus according to claim 40, wherein a
 - 2 pore in the porous material has such a pore diameter as
- 3 to attain a predetermined transmittance in the visible
- 4 light region.

the pore diameter is not more than 20 nm at which the 2 3 dye can enter the pore. 44. An apparatus according to claim 40, wherein the dye comprises an aromatic compound having a diazo 2 group. 3 45. An apparatus according to claim 44, wherein 2 the aromatic compound comprises one material selected from the group consisting of benzene, naphthalene, and 3 anthracene. 46. An apparatus according to claim 44, wherein the dye comprises a compound having any one of a 2 hydroxyl group, a sulfurous acid group, and primary to 3 tertiary amino groups. 4 47. An apparatus according to claim 40, wherein 2 the dye comprises a triphenylmethane stain. An apparatus according to claim 40, wherein 48. the dye contains fuchsonimine. 2

An apparatus according to claim 42, wherein

43.

49.

the dye contains indigo.

2

An apparatus according to claim 40, wherein

An apparatus according to any one of claims 47 50. and 48, wherein said sensing element further comprises a 2 material having an alkali characteristic in addition to 3 the dye. 4 An apparatus according to claim 40, wherein 51. said sensing element further comprises an acid gas 2 sorbent in addition to the dye. 3 An apparatus according to claim 51, wherein 52. the acid gas sorbent comprises one material selected 2 from the group consisting of glycerol and 3 triethanolamine. 4 An apparatus according to any one of claims 44 53. and 49, wherein said sensing element further comprises an acid in addition to the dye. 3 54. An apparatus according to claim 53, wherein the acid comprises one acid selected from the group consisting of hydrochloric acid, acetic acid, sulfuric 3 acid, and phosphoric acid. An apparatus according to claim 53, wherein 55. said sensing element further comprises a hygroscopic 2 compound in addition to the dye and the acid.

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- 56. An apparatus according to claim 55, wherein
- 2 the hygroscopic compound comprises one material selected
- 3 from the group consisting of glycerol and ethylene
- 4 glycol.
 - 57. An apparatus according to any one of claims 44
- 2 and 49, wherein said sensing element further comprises a
- 3 buffer in addition to the dye.
 - 58. An apparatus according to claim 57, wherein
- 2 the buffer comprises phosphoric acid and
- 3 sodiumdihydrogenphosphate dehydrate.